

FILTRATION

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Cooling Tower Water Filtration Is Key to Protecting Industrial Processes

Automatic self-cleaning strainers can help optimize cooling and process efficiency while minimizing maintenance and downtime.

By Del Williams, R.P. Adams Inc.

In industrial facilities such as manufacturing and processing plants as well as mills, forges and refineries, cooling towers often are used to remove heat from machinery, heated process material and fluids, buildings and other sources by exchanging the heat using water or chemical solutions as a coolant.

When cooling towers are not a closed circuit, however, air- and water-borne particulate can accumulate. This debris can subsequently foul or clog important

downstream machinery and equipment such as chillers, heat exchangers, spray nozzles and small-bore piping in cooling circuits. If not sufficiently addressed, this can significantly reduce the industrial facility's process efficiency and uptime.

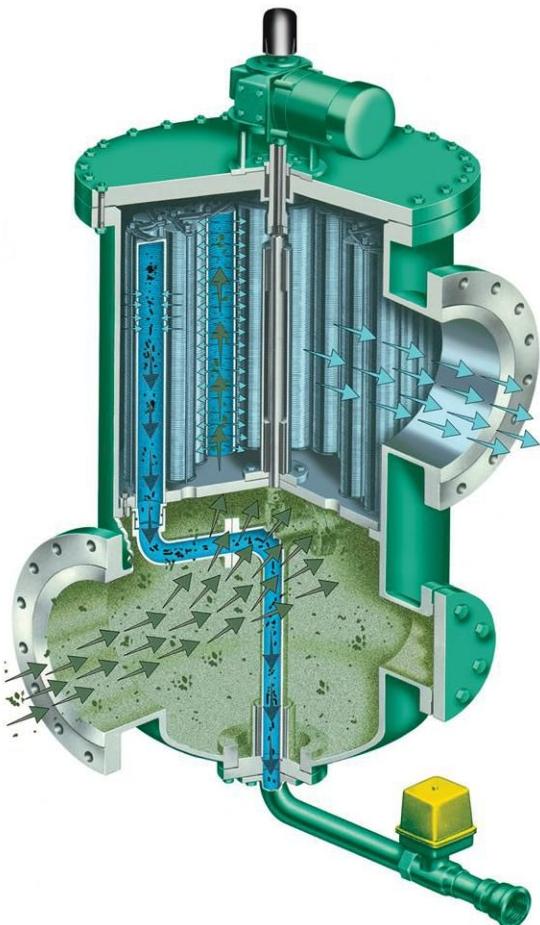
Because cooling towers rely on an evaporative cooling process with exposure to ambient air, any foreign material or elements in the air can easily get sucked into the tower. A portion of that will either get dissolved into the water or remain suspended in the water.

Water flowing through cooling towers can be contaminated from a number of sources, including ambient air, makeup water sources and residue picked up from processes.

Because the hard water used in cooling towers contains scale-forming minerals such as calcium and magnesium salts, the evaporative process leaves these solids behind in the water in high concentrations. Left undiluted, these minerals cause scaling on equipment surfaces. Even a small amount of scale in the system decreases the efficiency of heat transfer, resulting in decreased productivity in industrial processes. In severe cases, scale can completely plug heat exchangers and piping.

Abrasives particulate and suspended solids also can erode heat exchangers, pumps, piping, fittings and valves, further raising repair and replacement costs. As a consequence, many industrial facilities resort to time-consuming shut down of their cooling water systems a few times annually to clean the cooling tower and downstream equipment.

Methods for cooling tower water filtration include such as bag, cartridge sand-media filters as well as basket strainers. Drawbacks of these methods can include reliability, the need for labor-intensive cleaning or change-out and excess downtime. Another option for cooling tower filtration applications are multi-element, automatic self-cleaning strainers. Designed to offer reliability and efficiency, the multi-element, automatic self-cleaning strainers can help to optimize cooling and process efficiency while minimizing maintenance and downtime. This article will look at water filtration options for cooling tower water.

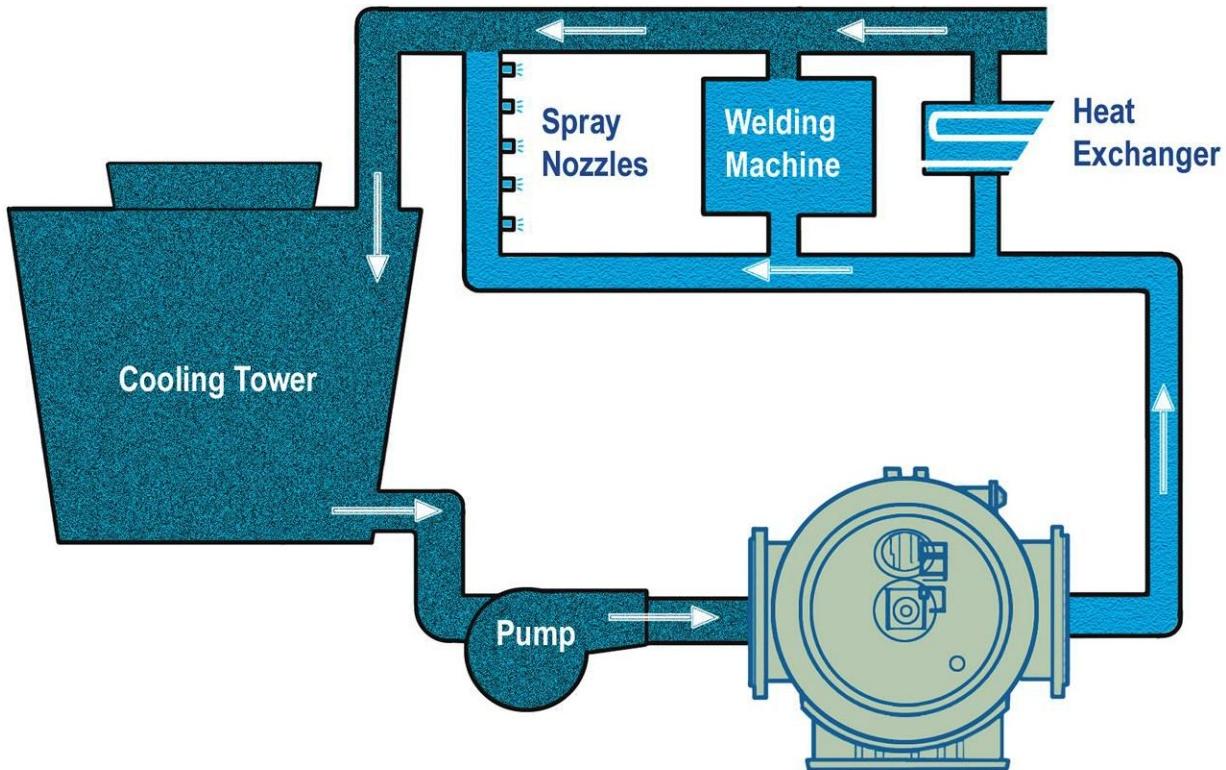


The multi-element design utilizes a tubesheet to separate the straining media from the backwash mechanism. This prevents the backwash mechanism from coming into contact with the media and damaging the elements.

Optimizing Process Reliability and Production

Bag filters generally can be effective at removing particulate between 5 to 200 microns in size. As bag filters accumulate debris, however, the buildup will cause water pressure to drop until the bags are cleaned or replaced. Additionally, operators must be careful not to rupture the bag during filtration.

Cartridge filters can be effective for fine filtration, usually between 0.5 and 50 microns, until they need to be changed. The



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filter vessel must be taken offline during changeout, which also requires manual labor.

Sand filters do not usually require routine replacement because the filter media can be backwashed with clean water and reused. The particulate is disposed of via a drain during the backwash cycle. One drawback is that sand filters must be offline during the backwash process. Also, over time, the backwash cycle can dull the sand granules by grinding their sharp edges against each other. This can them less effective at capturing and holding fine particulate.

Basket strainers typically are inexpensive to purchase, which is an advantage. Normally, they are only able to remove larger particulate (3,000 microns or greater) through perforated-screen elements. Also, cleaning

the units is usually labor intensive.

Industrial operators often also need to consider how to best reduce filter fouling and required maintenance. Traditional strainers can become clogged quickly due to limitations in straining area. When that occurs, cleaning, media replacement or backwashing is necessary, which adversely affects productivity as well as maintenance costs.

Multi-element, automatic self-cleaning strainers can provide continuous removal of suspended solids and particulate. When utilized for industrial cooling tower water filtration, the strainers can reliably filter out sand, silt and other suspended solids as small as 30 to 100 microns in size.

The engineering of the backwash

mechanism of the multi-element design is designed to enhance reliability. With traditional strainer designs, the backwash mechanism comes in direct contact with the straining media. This can be problematic because the large and oversized solids often encountered with raw water can become lodged between the straining media and the backwash assembly. The result can be straining media damage or rupture. If that occurs, it can compromise filtration and even other equipment, hindering production.

One multi-element design utilizes a tubesheet to separate the straining media from the backwash mechanism. This prevents the backwash mechanism from coming into contact with the media and damaging the elements. Also, the multi-element design provides greater surface area compared to many traditional strainers and prefilters. This results in less frequent backwashing, which reduces water and power consumption as well as maintenance requirements.

In addition, the smaller diameter of the media used in the multi-tube strainers enables the strainer to safely handle differential pressures in excess of 150 psig. This protects industrial processes and production even during high differential pressure events that could otherwise result in significant downtime.

As an additional protective measure, some multi-element automatic self-cleaning strainer systems include a shear key, which sacrifices itself in the presence of excessively large debris. If large debris were to cause mechanical problems within the strainer, the shear key breaks, protecting the unit's rotating assembly, motor and gearbox by halting the drive-shaft rotation. Filtration continues, but operators notice an increase in differential

pressure as the backwash cycle is interrupted. Then, the operators can take action to clear the obstruction and replace the shear key.

In addition, for industrial environments exposed to highly corrosive elements, materials such as super duplex and duplex stainless steels, titanium, Monel, Inconel and Hastelloy can provide resistance to corrosion and corrosion-related damage.

When considering technology for industrial cooling tower filtration systems, automatic multi-element, self-cleaning filters offer advantages to consider for many industrial process applications. **PC**

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